# SHOT NOISE IN FERROMAGNETIC TUNNEL JUNCTIONS

**B.R. Bułka**[1], **J. Martinek**[1], **G. Michałek**[1] **and J. Barnaś**[2]
[1]Institute of Molecular Physics, Polish Academy of Sciences, Poznań, Poland
[2]Department of Physics, A. Mickiewicz University, Poznań, Poland

9.7 cm

Interplay of spin and charge effects on frequency dependent current noise in ferromagnetic single electron devices have been investigated theoretically. The power spectrum of spin polarized tunneling currents has been determined in the limit of incoherent sequential tunneling. The effects of electrostatic interactions and Pauli exclusion principle have been taken into account. We show that apart from charge fluctuations there are also strong spin fluctuations which influence the current noise. The frequency dependent current noise has two components, which correspond to two different relaxation processes: the one in the low frequency range assigned to spin fluctuations and the other one in the high frequency range assigned to charge fluctuations. When the intrinsic spin relaxation time is sufficiently long, competition between different currents in both spin channels can lead to spin accumulation. In double barrier devices with highly spin asymmetric tunnel resistances the spin accumulation is responsible for negative differential resistance (NDR). It is shown that strong spin fluctuations activated in the range of NDR cause a large enhancement of the current shot noise.
*The paper is supported by KBN within Grant No. 2 P03B 075 14.*

13.4 cm

**Subject category :**

2. Magnetic Films, Surfaces and Multilayers

**Presentation mode :**
oral

**Corresponding author :**
B.R. Bułka

**Address for correspondence :**
Institute of Molecular Physics, Polish Academy of Sciences,
ul. Smoluchowskiego 17, 60-179 Poznań, Poland

**Email address :**
bulka@ifmpan.poznan.pl